



National Weather Service - San Diego



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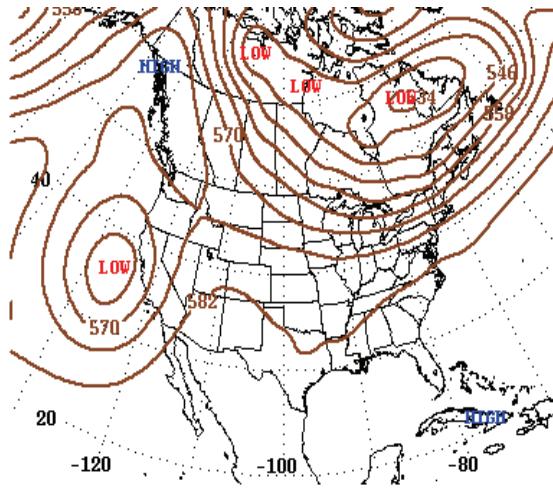
weather.gov/sandiego

July 2009

Lightning in June? by Ted Mackechnie and Miguel Miller

If the question were asked: During which month is a thunderstorm *least* likely to occur in Southern California? For anyone familiar with Southern California weather, the answer would be June! Yet the region experienced a theatrical storm production in which lightning was in the starring role.

Unstable air ahead of a Pacific upper low (see map at right) produced high based, short-stacked thunderstorms, which contained intense dry lightning, large hail, and brief heavy showers on Wednesday, June 3. The cells moved rapidly from southwest to northeast at 50 mph. About 1500 lightning strikes hit the ground during the day, starting 70 fires mostly in the San Bernardino Mountains. Wind blew part of a tree to the ground in Big Bear City, hitting a truck and killing



500-Millibar Height Contour at 7:00 A.M. E.S.T.

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A series of thunderstorms approaches the Mill Creek area from the Inland Empire on June 3, 2009.
Photo courtesy of weather spotter Brandon Barsugli.

About 1500 lightning strikes hit the ground during the day on June 3.

Lightning in June? - continued

the driver inside. Another died being struck by lightning in Fontana. Two outdoor workers were injured by lightning in San Marcos. In Del Mar-Carmel Valley a hailstorm produced hail nearly one inch in diameter. In Lucerne Valley a downburst wind gust of 52 mph was measured.

A similar event occurred in far northern California a year ago in June 2008. Remember the hundreds of wildfires triggered by lightning storms that took many weeks to contain? That kind of thing is rare in June, even that far north, but not as rare as it is in Southern California.

All of the 70 fires that were started by the lightning striking dry brush were small and were contained quickly. The largest fire, called the McKinley fire, burned 180 acres in the foothills above Highland, and was completely extinguished within three days of ignition.

This dry lower layer also contributes to strong, damaging downburst winds. As the rain falls into a dry layer, much of the rain evaporates, cooling the air. This air finds itself heavier than the surrounding warm air and plummets to the ground. This occurred in isolated instances, most notably producing the 52 mph gust in Lucerne Valley. The wind began to move heavy objects around and the observing spotter incurred minor facial abrasions from the driving hail. Not surprisingly, the temperature fell from 68 degrees to 55 in a few minutes.

The size of hail is a good indicator of the power of a thunderstorm. One thunderstorm in the Del Mar-Carmel Valley area contained enough instability for just a few minutes to produce hail that approached one inch in size. This produced minor damage to cars.

What caused these rare storms?

Upper air data indicated that the higher levels of the atmosphere above about 10,000 feet destabilized significantly while moisture at the same level increased substantially. It was an unstable and moist environment above 10,000 feet just ready for some lifting mechanism to unleash its energy. Diffluent flow aloft (air dispersing or spreading out at high levels) induced such a lifting mechanism which triggered the thunderstorms. Rainfall was insignificant because the dry lower atmosphere evaporated most of the rain.



Hesperia thunderstorms of June 3 offered beautiful and interesting clouds. Photo courtesy of Skywarn spotter Phillip Dupree.

An upper level low pressure off the coast can produce these wild thunderstorm outbreaks



Are you kidding me?? Hail approaching one inch in diameter fell in Carmel Valley on June 3, 2009. Photo by Flickr photographer Michael J. Slezak.

Lightning Safety—A Hot Topic During Lightning Safety Awareness Week

Our love of outdoor activities and the frequency of thunderstorms make summer the most likely time to be injured or killed by lightning, according to statistics compiled by the National Weather Service. In order to reduce lightning injuries and fatalities, the NWS observed Lightning Safety Awareness Week June 21-27, 2009.

More than 70 percent of lightning fatalities occur between June and August, says John Jensenius, the National Weather Service lightning expert who tracks and evaluates lightning deaths.

Annually lightning strikes more than 400 people in the United States. About 60 of those die, and many more are left with devastating and permanent disabilities. The National Weather Service studies lightning fatalities in order to know where to best aim its lightning education efforts. For example, men are struck far more often than women, sustaining about 85 percent of lightning deaths. And men under 40 account for 60 percent of all lightning fatalities.

"At the start of summer when people are getting ready to enjoy outdoor activities, we want to remind them that lightning is very dangerous," says Jensenius. "Lightning can kill - so remember - when thunder roars, go indoors."

A new brochure, *Lightning Safety for You and Your Family*, provides basic facts about lightning and information on how to stay safe during potentially deadly thunderstorms. It provides information for people participating in organized outdoor activities and identifies actions to take if someone is struck by lightning. The brochure is available through the lightning safety Web site: www.weather.gov/os/lightning/pdfs/lightning-safety.pdf.

To avoid being struck by lightning, the National Weather Service recommends that you:

- Get into a fully enclosed building or hardtop vehicle at the first rumble of thunder
- Stay indoors for 30 minutes after the last thunder clap
- Monitor the weather forecast when you're planning to be outdoors
- Have a plan for getting to safety in case a thunderstorm moves in
- Do not use a corded phone during a thunderstorm unless it's an emergency; cell phones are safe to use
- Keep away from plumbing, electrical equipment and wiring

You can learn more about lightning safety on the NWS' Lightning Safety Web site: www.lightningsafety.noaa.gov.



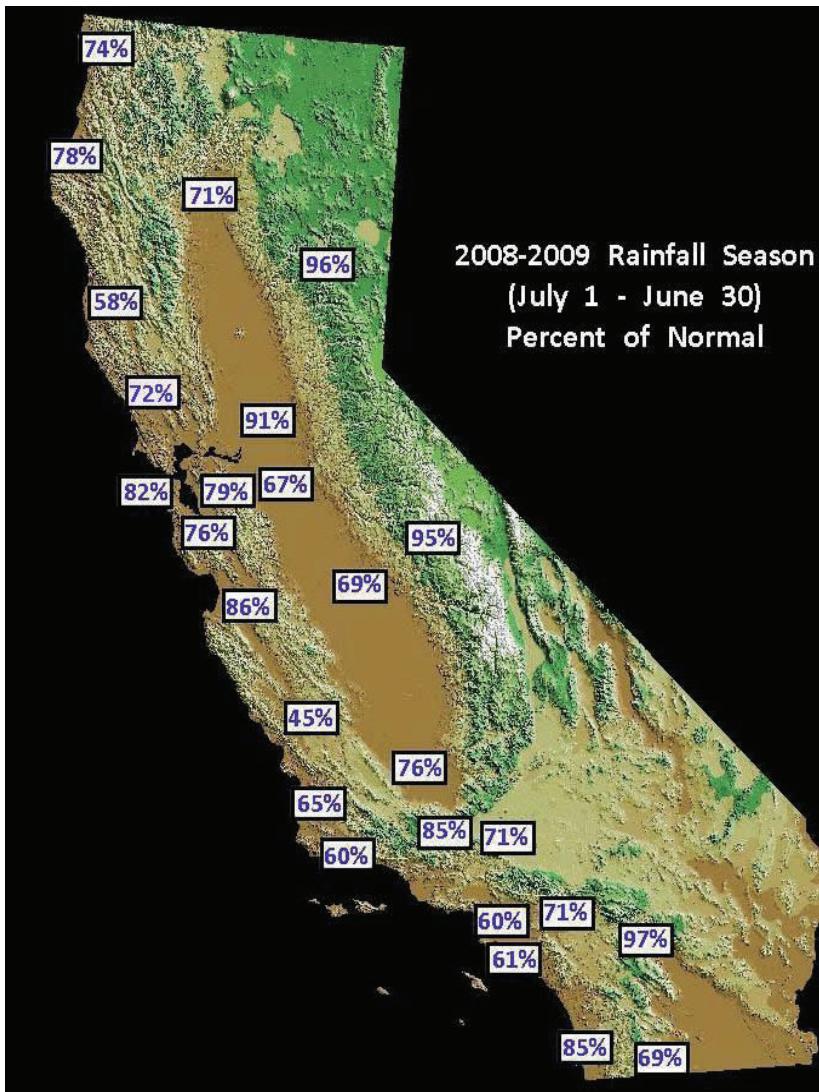
A thunderstorm approaches San Clemente on August 26, 2007.
Photo by weather spotter Khristian Snyder.

More than 70 percent of lightning fatalities occur between June and August



Lightning strikes Oceanside! Photo courtesy of NWS forecaster Steven Vanderburg.

Seasonal Rainfall for 2008-2009



U.S. Drought Monitor West

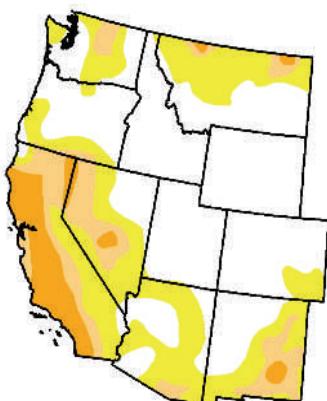
June 30, 2009

Valid 7 a.m. EST

Drought Conditions (Percent Area)						
	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	55.1	44.9	17.9	7.1	0.0	0.0
Last Week (06/23/2009 map)	54.7	45.3	18.6	7.4	0.0	0.0
3 Months Ago (04/07/2009 map)	36.5	63.5	26.3	7.1	0.0	0.0
Start of Calendar Year (01/06/2009 map)	37.4	62.6	28.9	8.8	0.4	0.0
Start of Water Year (10/07/2008 map)	41.3	58.7	28.6	10.4	0.1	0.0
One Year Ago (07/01/2008 map)	40.6	59.4	35.2	9.2	1.7	0.0

Intensity:

D0 Abnormally Dry	D3 Drought - Extreme
D1 Drought - Moderate	D4 Drought - Exceptional
D2 Drought - Severe	



The Drought Monitor focuses on broad-scale conditions.
Local conditions may vary. See accompanying text summary
for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, July 2, 2009
Author: R. Tinker, CPC/NOAA

	2008-2009 Rain (in.)	% Normal	Normal Rain (in.)
...NORTHERN CALIFORNIA...			
EUREKA	29.75	78%	38.1
REDDING	23.71	71%	33.52
SACRAMENTO EXEC AIRPORT	16.33	91%	17.93
SAN FRANCISCO	18.16	82%	22.28
SAN JOSE	11.51	76%	15.08
8 STATION NRN SIERRA INDEX	46.30	96%	48.03
...CENTRAL CALIFORNIA...			
FRESNO	7.77	69%	11.23
BAKERSFIELD	4.95	76%	6.49
PASO ROBLES	5.87	45%	13.09
SANTA MARIA	9.12	65%	14.01
5 STATION SAN JOAQUIN-SIERRA INDEX	38.90	95%	40.8
...SOUTHERN CALIFORNIA...			
PALMDALE	5.24	71%	7.36
SANTA BARBARA	10.12	60%	16.93
BIG BEAR LAKE	15.01	71%	21.15
LOS ANGELES / USC	9.08	60%	15.14
LONG BEACH	9.45	73%	12.94
FULLERTON	10.05	89%	11.23
IRVINE - JOHN WAYNE	7.72	61%	12.76
VISTA	8.60	63%	13.69
RAMONA	12.07	74%	16.41
SAN DIEGO - LINDBERGH	9.15	85%	10.77
ONTARIO	9.40	64%	14.77
RIVERSIDE	6.67	65%	10.22
IDYLLWILD	18.27	66%	27.80
PALM SPRINGS	5.07	97%	5.23
THERMAL	2.75	78%	3.53
PALOMAR MOUNTAIN	19.47	65%	29.96
CAMPO	10.71	69%	15.58
BORREGO SPRINGS	4.90	71%	6.91

Quarterly Summary

April

A broad low pressure trough covered much of interior North America during the first week of April which kept a dry northwest flow over California. Low pressure strengthened along the west coast during the second week bringing periods of mostly light showers. A strong upper-level ridge developed during the third week of the month resulting in dozens of record high temperatures from the 19th through the 21st. During the final ten days, the trough returned to the west coast with cool and dry weather. Average monthly temperatures ranged between exactly normal at San Diego and two degrees Fahrenheit below normal.

A weakening trough associated with a large cut-off low off the central California coast, brought a period of light rain on the evening of the 7th. Most areas reported less than one-tenth of an inch of rain from the weakening system.

A strong and cold trough deepened along the west coast on the 10th. Weak upslope flow and instability in the trough resulted in showers and isolated thunderstorms on the 10th into the 11th. Rainfall ranged from less than 0.10 inch along the coast and in the valleys, to 0.50 to 1 inch from northern San Diego

County into the southern San Bernardino Mountains. Snow fell above 5500 feet with two inches reported at Idyllwild. An isolated 1.40 inches of rain fell at Valley Center in northern San Diego County. Only very light amounts of rain were reported in the southern deserts, but some northern desert spots reported near 0.25 inch.

Thanks to one event, the Riverside County Mountains and portions of northern San Diego County received close to 50% of normal rainfall for the month, elsewhere it was another dry month, with precipitation amounts below 25% of normal.

May

Low pressure over the Gulf of Alaska, and a broad high pressure ridge over Mexico, set up a dry zonal flow over California for the first half of the month. A high pressure ridge briefly developed over the state around the middle of the month bringing hot weather to inland areas. During the final ten days, weak low pressure aloft brought a deep marine layer and seasonal spring weather. The deep marine layer brought light amounts of rain to coastal areas during the last few days of the month. Average monthly temperatures away from the beaches ranged between two and six degrees Fahrenheit above normal.

San Diego - Lindbergh Field Data - April

	Max	Min	Avg	Rain
Actual	68.4	56.7	62.6	0.14
Normal	68.7	56.4	62.6	0.75
Anomaly	-0.3	0.3	0.0	-0.61
% of normal				19
Max	98	63		0.09
Min	61	52		

San Diego - Lindbergh Field Data - May

	Max	Min	Avg	Rain
Actual	67.9	62.2	64.1	0.04
Normal	69.3	59.8	64.6	0.20
Anomaly	-1.4	2.4	0.5	0.04
% of normal				20
Max	75	63		0.04
Min	63	57		

A weak trough of low pressure brought mid-level moisture northward over the area on the 18th

Quarterly Summary—continued

and 19th. High-based scattered showers and isolated thunderstorms developed over the mountains and deserts, but no measurable precipitation was reported.

Another weak upper low ushered in a deep marine layer to coastal areas, and brought scattered, mostly light rain from the 29th through the 31st of the month. Isolated showers and thunderstorms developed on the 29th over northern mountain and desert areas, but reported amounts were less than one-quarter inch. On the 30th, coastal San Diego County reported widespread amounts under one-tenth of an inch. More patchy light rain and drizzle was reported on the 31st.

Except for coastal San Diego County where May rainfall was 20% to 35% of normal, little rain fell. For the season, most areas in and west of the mountains had precipitation totals between 60% and 80% of normal, while the deserts reported between 75% and 100% of normal.

June

An unseasonably strong area of low pressure off the central coast of California dominated weather across the state during the first week of June, bringing periods of rain, drizzle, thunderstorms, and cool conditions. The persistent trough over the area continued the cool, and occasionally damp weather with extensive marine clouds west of the mountains into the fourth week of the month. On the final three days, high pressure strengthened over the southwest U.S. and brought a weak monsoonal flow into the mountains and deserts, but little rain was reported. Average monthly temperatures ranged between one and four degrees Fahrenheit below normal.

San Diego - Lindbergh Field Data - June				
	Max	Min	Avg	Rain
Actual	70.0	62.3	66.2	0.03
Normal	72.2	62.6	67.4	0.09
Anomaly	-2.2	-0.3	-1.2	-0.06
% of normal				33
Max	74	64		0.03
Min	66	60		

Anomalous low pressure off the central coast of California set up an unstable southwest flow over the region on the 3rd. Instability and moisture aloft triggered bands of rare June thunderstorms with hundreds of lightning strikes, light rain, and moderate hail. The lightning triggered scores of fires that were quickly extinguished. Two deaths were attributed to the storms. Due to the high bases of the storms and dry air below, rainfall reports were mostly less than one-tenth of an inch, however locally heavier amounts did occur in isolated spots where training of cells occurred. Temecula reported two tenths of an inch of rain, and Hesperia and Big Bear reported slightly less. Numerous reports of pea-sized hail were received, but isolated stones of from one-half, to as much one inch fell.

A more significant wave moved over the area on the 16th accompanied by some light rain in San Diego County, but amounts were under one tenth of an inch. An isolated thunderstorm produced a third of an inch of rain and small hail in Wrightwood late in the day.

Even though June is typically a dry month, many areas did receive rain, but it added little to the final season totals. Most areas in and west of the mountains ended the season with between 60% and 80% of normal, while the deserts reported between 75% and 100% of normal.

Is El Niño Coming Back?

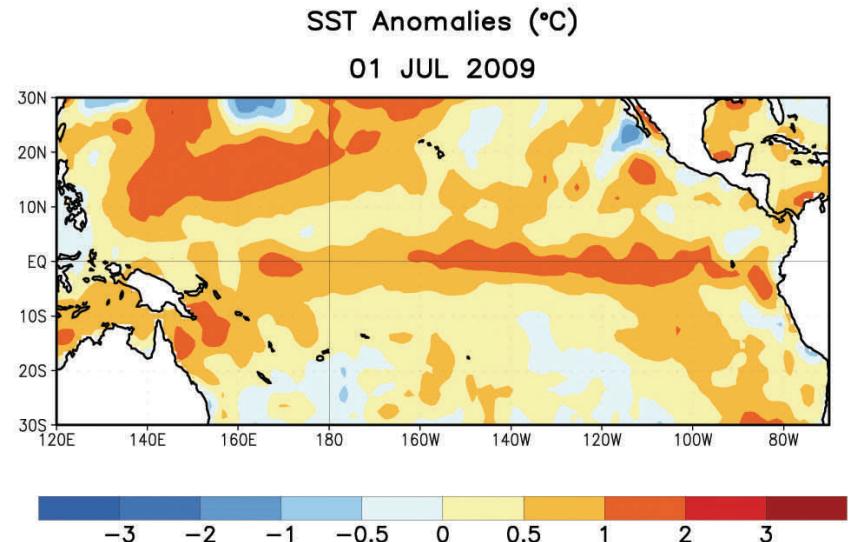
On July 9, NOAA scientists announced the arrival of El Niño, a climate phenomenon with a significant influence on global weather, ocean conditions and marine fisheries. El Niño, the periodic warming of central and eastern tropical Pacific waters, occurs on average every two to five years and typically lasts about 12 months.

NOAA expects this El Niño to continue developing during the next several months, with further strengthening possible. The event is expected to last through winter 2009-10. "Advanced climate science allows us to alert industries, governments and emergency managers about the weather conditions El Niño may bring so these can be factored into decision-making and ultimately protect life, property and the economy," said Jane Lubchenco, NOAA administrator.

El Niño's impacts depend on a variety of factors, such as intensity and extent of ocean warming, and the time of year. Contrary to popular belief, not all effects are negative. On the positive side, El Niño can help to suppress Atlantic hurricane activity. In the United States, it typically brings beneficial winter precipitation to the arid Southwest, less wintry weather across the North, and a reduced risk of Florida wildfires.

El Niño's negative impacts include damaging winter storms in California and increased storminess across the southern United States. Some past El Niños have also produced severe flooding and mudslides in Central and South America, and drought in Indonesia.

In its monthly El Niño diagnostics discussion, scientists with the NWS' Climate Prediction Center noted weekly eastern equatorial Pacific sea surface temperatures were at least 1.0 degree C above average at the end of June. The most recent El Niño occurred in 2006. El Niño includes weaker trade winds, increased rainfall over the central tropical Pacific, and decreased rainfall in Indonesia. These vast rainfall patterns in the tropics are responsible for many of El Niño's global effects on weather patterns.

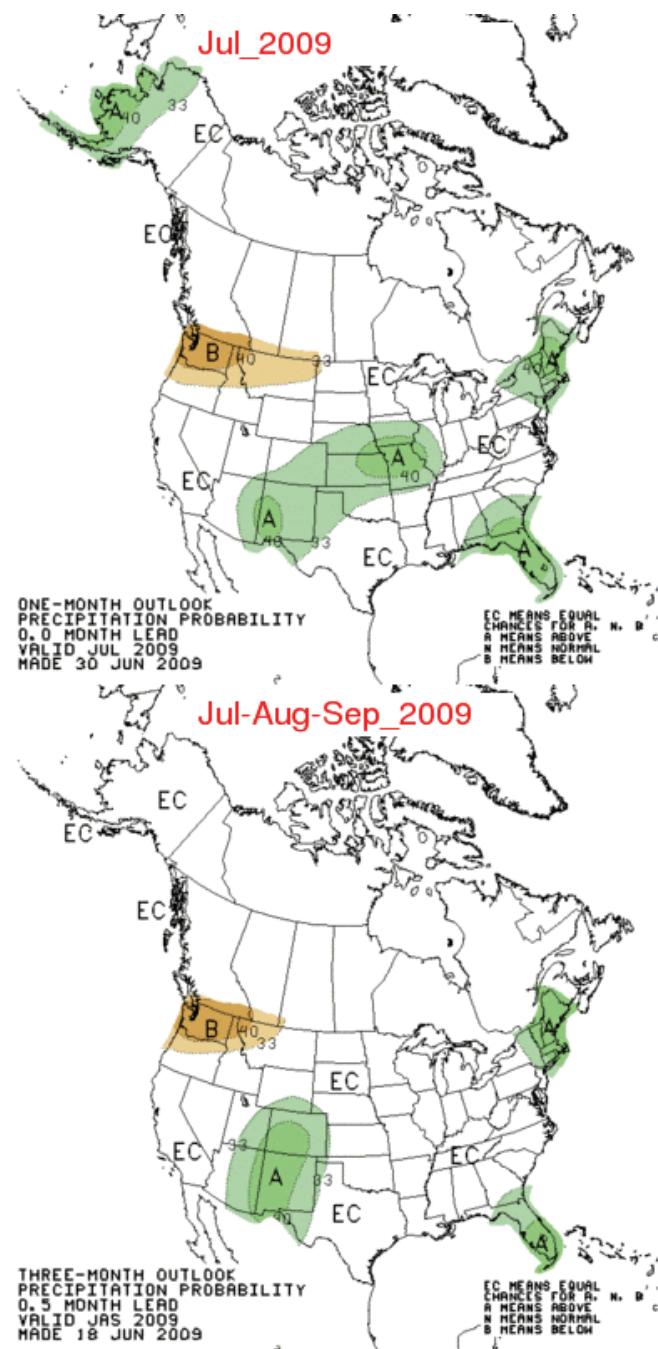
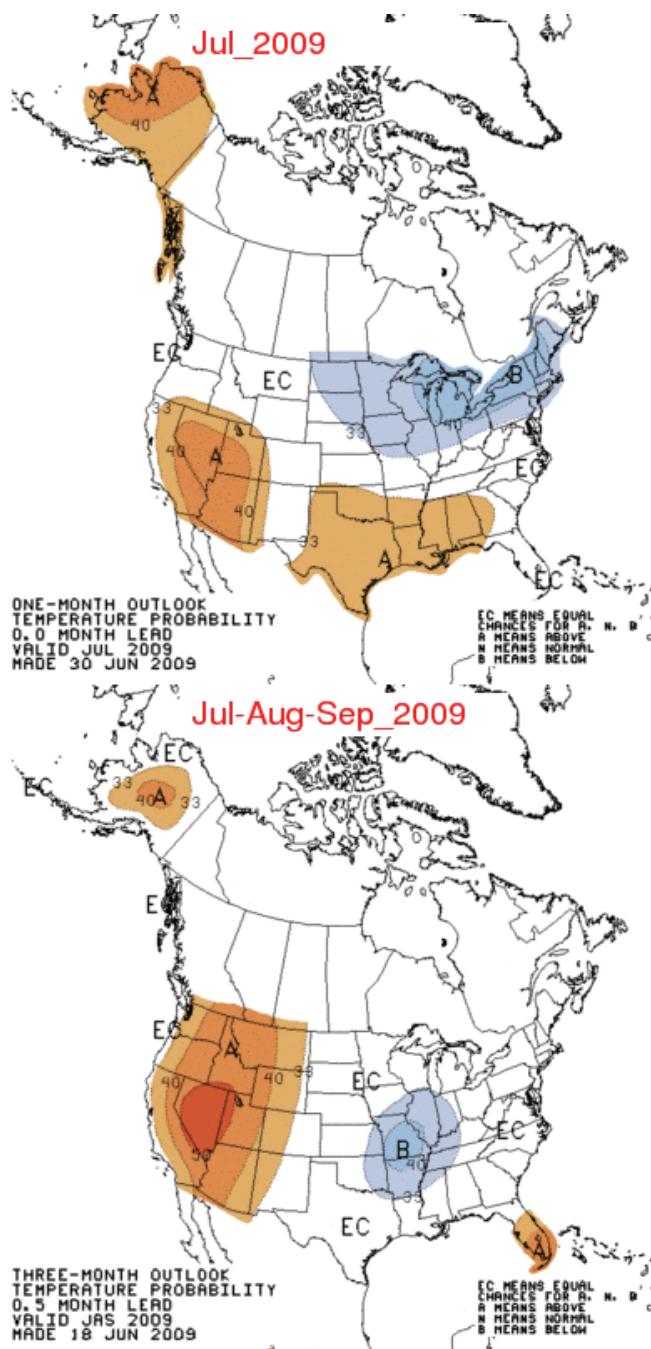


Jan Null, a private meteorologist and former NWS forecaster based in the Bay Area, has compiled a lot of great information about El Niño that is easy to understand. He offers an interpretation of what to expect based on past El Niño events. You can find it at: ggweather.com/enso.htm.

Late Summer Outlook

The temperature outlook for July, August and September calls for above normal temperatures across much of the western U.S. from the Rockies all the way to, but not including, the West Coast, Central Alaska and South Florida. Increased chances of below normal temperatures are predicted for Missouri and the central Mississippi River Valley.

There is an enhanced likelihood of above average precipitation for July, August and September for the Southern Rockies and Colorado Plateau (an active monsoon season), as well as New England and Florida. Below average precipitation is expected for the Pacific Northwest.



Spotter and Skywarn News

The lightning storm event of June 3 illustrated a few things. Among them: sometimes a spotter report can be quite useful, even when no dangerous or “significant” weather as defined by spotter training has occurred. On that day the radar was “running hot”, as we forecasters say. That means the radar echoes are in the hot colors of orange and red, which usually means very intense rain, and an increased risk of flash flooding. Once we got a few spotter reports and after some of the echoes passed over our rain gauges, we learned just how light the rainfall was and how hot the radar was running. It really was raining hard higher up in the cloud as detected by radar, but the dry lower levels evaporated most if not all of that rain before it reached the ground. With spotters and gauges reporting negligible rain rates, we could put to rest any fears about flash flooding and concentrate on the bigger threats of lightning strikes, hail and strong winds. In addition, our lightning detection network failed us over a large chunk of our area during this storm and we were left without confirmation of strikes. Thanks for the reports of lightning strikes and hail of any size. As you know, hail size is a pretty good measure of the severity of a thunderstorm. A hail report also confirms to us that we’re dealing with a thunderstorm.

Stay tuned for a new and improved online spotter report form coming soon to our website near you.

Thank you for letting us know what’s going on out there.
Get ready for the monsoon!



A thunderstorm pops southeast of Poway on August 22, 2006. Photo by spotter Maureen Lewis.

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Spotter reports online: espotter.weather.gov

Weather Spotter web site: www.wrh.noaa.gov/sgx/spotter/spotter.php

(*Coast to Cactus* can always be found on this page.)

The *Weather Guide*, a weather companion and reference, is available online at:

www.wrh.noaa.gov/sgx/research/Guide/weather_guide.php?wfo=sgx

Southwest California Skywarn© web site: swskywarn.org , e-mail: swskywarn@swSkywarn.org

Change of: Address (email or home)? Phone numbers? Equipment?, etc. Please email Miguel with the changes.

Weather photos you wish to share? Email them to miguel.miller@noaa.gov.

Be sure to include:

1. Name of photographer
2. Where and when it was taken
3. Brief description of photo
4. If we have permission to use it for training or publications